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SPECTROSCOPY.—*Quartet-system multiplets in the arc spectrum of yttrium.*[1] W. F. MEGGERS. Bureau of Standards, and B. E. MOORE, University of Nebraska.

In a recent note on *Spectrum regularities for scandium and yttrium*[2] doublets in the arc spectra and triplets in the spark spectra were discussed, and attention was directed to the close correspondence of spectral structures for these two elements. Zeeman effect data[3] confirming most of the arc and spark multiplets of yttrium were reproduced, but there existed at that time no published data for magnetic resolutions of scandium lines. Such have since been published by S. Goudsmit, J. Van der Mark and P. Zeeman,[4] and their measurements positively identify certain doublet and triplet terms respectively in the Sc I and Sc II spectra.

On the basis of King's[5] intensity and temperature classification of scandium lines, Catalán[6] published three multiplets belonging to the quartet system of the arc spectrum, the occurrence of which was required by the rule[7] that the maximum multiplicity in a spectrum is one unit greater than the column number for the element. With the aid of Landé's[8] interval rule the combining spectral terms were identified as high ^4F (read "quartet F") and lower ^4D, $^4F'$, and ^4G terms. No data for the Zeeman effect of these lines have been published.

[1] Published by permission of the Director of the Bureau of Standards of the U. S. Department of Commerce.
[2] MEGGERS, This Journal **14**: 419. 1924.
[3] MOORE, Astrophys. Jour. **28**: 1. 1908.
[4] Kon. Akad. Wet. Amsterdam **33**: 975. 1924.
[5] Astrophys. Journ. **54**: 28. 1921.
[6] Anales Soc. Espan. Fis. y Quim. **21**: 464. 1923.
[7] LAPORTE, Die Naturwissenschaften **11**: 779. 1923.
[8] Zeit. f. Physik. **15**: 189. 1923.

In the case of yttrium no temperature classification has been published, and the Zeeman effect data were not extensive enough to identify the quartet terms. The latter deficiency has recently been corrected by the authors; new measurements of magnetic resolutions of yttrium arc lines at once revealed the prominent quartet terms which are the analogues of those in scandium mentioned above. In either case the absolute values of these terms are still unknown but their relative values are compared in Table 1, in which the level with smallest energy content is called zero.

TABLE 1.—RELATIVE TERMS IN QUARTET SYSTEMS

Term	*Scandium*	*Yttrium*
F_2	00.00	00.00
F_3	37.67	141.33
F_4	90.28	340.64
F_5	157.33	594.80
D_1	31117.4	22278.0
D_2	31139.2	22328.1
D_3	31176.8	22420.4
D_4	31231.5	22677.2
F_2'	29652.5	20571.1
F_3'	29695.8	20742.7
F_4'	29755.6	20971.8
F_5'	29831.0	21250.8
G_3	27502.9	17756.7
G_4	27576.2	18051.5
G_5	27669.8	18426.9
G_6	27783.5	18883.2

The interval ratios of the yttrium terms are as follows:

	Observed						*Calculated*		
^4F	254.16 :	199.31 :	141.33 = 9.000	: 7.058	: 5.004	9	: 7	: 5
^4D	256.88 :	92.36 :	50.09 = 7.0	: 2.5	: 1.4	7	: 5	: 3
$^4F'$	278.90 :	229.12 :	171.55 = 9.0	: 7.4	: 5.5	9	: 7	: 5
^4G	456.26 :	375.35 :	294.73 = 11.00	: 9.05	: 7.10	11	: 9	: 7

The agreement between observed and calculated interval ratios is almost perfect for the lowest F level, and although it is very poor for the ^4D term it becomes progressively better for the high levels as the azimuthal quantum number increases.

Three quartet system multiplets resulting from the combinations of the above terms for yttrium are presented in Table 2. The multiplets are arranged with term designations and intervals at the margins, each spectral line being represented by its observed wave length, estimated intensity (in parenthesis), and vacuum wave number.

Exposures for the Zeeman effect of the yttrium lines in Table 2 were made with the spectrograph and magnet in the Brace Laboratory

TABLE 2.—QUARTETS IN THE ARC SPECTRUM OF YTTRIUM

	F_5 254.16	F_4 199.31	F_3 141.33	F_2
D_4	4527.26(8)	4475.71(4)	4436.14(1)	
	22082.27	22336.59	22535.82	
256.88				
D_3		4527.79(8)	4487.29(3)	4458.95(2)
		22079.68	22278.96	22420.52
92.36				
D_2			4505.95(8)	4477.41(4)
			22186.67	22328.11
50.09				
D_1			—	4487.48(6)
				22278.02
F'_5	4839.86(10)	4781.04(3)		
	20656.00	20910.13		
278.90				
F'_4	4906.10(3)	4845.68(8)	4799.31(4)	
	20377.14	20631.19	20830.51	
229.12				
F'_3		4900.11(10–x)	4852.69(8)	4819.64(3)
		20402.05	20601.40	20742.67
171.55				
F'_2			4893.44(3)	4859.83(8)
			20429.84	20571.13
G_6	5466.45(10)			
	18288.35			
456.26				
G_5	5606.32(3)	5527.53(10)		
	17832.09	18086.26		
375.35				
G_4	———	5644.68(4)	5581.86(8)	
	17456.8	17710.91	17910.20	
294.73				
G_3		5740.23(1)	5675.26(3)	5630.12(8)
		17416.08	17615.47	17756.69

of Physics; the spectrograms were measured at the Bureau of Standards. In Table 3 the observed values are compared with those calculated according to Landé.[9] The parallel components (in parenthesis) are followed by the perpendicular components, and in complex patterns the strongest component of either set is printed in bold face type while some of the weaker components are represented by asterisks. The exposures obtained thus far do not permit the measurement of

TABLE 3.—ZEEMAN EFFECT OF YTTRIUM ARC LINES

Terms	λ *I.A.*	*Obs.*	*Calc.*
F_2D_1	4487.48	(——) **0.58**	(0.20) 0.20, **0.60**
F_4D_4	4475.71	(0.46) 1.27	(** 0.48, **0.67**) ** 1.14, **1.33**, 1.52 **
F_3D_2	4477.41	(——) 0.00, **0.77**, 1.53	(0.40, **1.20**) 0.00, **0.80**, 1.60
F_3D_3	4487.29	(——) 1.20	(* 0.52, **0.86**) * 0.86, **1.20**, 1.54, *
F_3D_2	4505.97	(0) 0.84	(**0.08**, 0.26) **0.77**, 0.94, 1.12, 1.28
F_5D_4	4527.26	(0) 1.11	(**0.05**, 0.15 **) **1.00**, 1.10, 1.19, 1.29****
F_4D_3	4527.79	(0) 1.07	(**0.07**, 0.20, 0.33) **0.90**, 1.04, 1.17, 1.30**
F_4F_5'	4781.04	(0) 1.46	(**0.05**, 0.14, **)***** 1.48, 1.57, **1. 67**
F_3F_4'	4799.31	(w) 1.55	(**0.10**, 0.31 *)*** 1.34, 1.55, **1.76**
F_2F_3'	4819.64	(**0.31**, 0.95) 1.94	(**0.31**, 0.94) 0.09, 0.71, 1.34, **1.97**
F_5F_5'	4839.86	(0) 1.34	(0) 1.33
F_4F_4'	4845.68	(0) 1.23	(0) 1.24
F_3F_3'	4852.69	(0) 1.03	(0) 1.03
F_2F_2'	4859.83	(0) 0.41	(0) 0.40
F_3F_2'	4893.44	(**0.32**, 0.95) 1.96	(**0.31**, 0.94) 0.09, 0.71, 1.34, **1.97**
F_4F_3'	4900.11	(0) 1.06[a]	(**0.10**, 0.31 *)*** 1.34, 1.55, **1.76**
F_5F_4'	4906.10	(0) 1.51	(**0.05**, 0.14 **)***** 1.48, 1.57, **1.67**
F_5G_6	5466.45	(0) 1.13	(**0.03**, 0.09 ***) **1.00**, 1.06, 1.12 *******
F_4G_5	5527.53	(0) 1.05	(**0.03**, 0.10. **) **0.94**, 1.00, 1.07 *****
F_3G_3	5581.86	(0) 0.93	(**0.02**, 0.07, 0.11) **0.87**, 0.91, 1.00 **
F_5G_5	5606.32	(0.62) 1.22 w	(*** 0.57, **0.73**) *** 1.10, **1.26**, 1.42 ***
F_2G_3	5630.12	(0) 0.72	(**0.09**, 0.26) 0.31, 0.49. 0.66, **0.83**
F_4G_4	5644.68	(0.85) 1.11	(** 0.64, **0.89**) ** 0.86, **1.11**, 1.37 **
F_3G_3	5675.26	(1.14) ——	(0.23, 0.68, **1.14**) * 0.34, **0.80**, 1.26 *

[a] Intense spark line coincident. $^3F_3 - {}^3D_3$, (**0.00**, 0.08 *) **0.92**, 1.00, 1.08 **.

some of the fainter components in complex patterns but even the unresolved patterns are in qualitative agreement with the calculated values. The observations are being extended and a complete presentation together with further regularities in the spectra of yttrium will be given in another paper.

[9] Zeit. f. Physik. **15**: 189. 1923.

ENTOMOLOGY.—*An extraordinary adult myrmecophile from Panama.* RAYMOND C. SHANNON, Bureau of Entomology, Department of Agriculture. (Communicated by S. A. ROHWER.)

Under the title *Two extraordinary larval myrmecophiles from Panama,*[1] Dr. W. M. Wheeler recently described a peculiar larva of a dipteron which he thought might prove to belong to the genus *Microdon* (Syrphidae) or to a closely allied genus. As a result of his paper, additional data relating to this group of myrmecophiles came to light, all of which fit together fairly well to make a very interesting account. Incidentally, a new species of *Microdon*, peculiar enough to be quite in keeping with the remarkable larva recorded by Wheeler and which may eventually prove to be the adult, was found in the National Museum collection and is described below.

Dr. Wheeler found more than a hundred individuals of a peculiar type of larva in the nest of an ant, *Azteca trigona* Emery. No adults were reared and the authenticated imago remains unknown. Wheeler states that a study of the larvae "shows a vague kinship to the Syrphid Microdon, * * *. On the other hand the rigidity of the integument on the ventral surface and absence of a creeping-sole, the proportionally much greater development of the thoracic segments, the large, cylindrical and undoubtedly functional prothoracic stigmata, the finer structure of the posterior stigmata, etc., are all characters which separate the larva under discussion from the Syrphidae and other aschizous Cyclorrhapha. Since it in all probability represents a new genus and may even represent a new family of Diptera I propose to call it *Nothomicrodon aztecarum* gen. nov. et sp. nov.

"What the larvae do in the carton nests of *Azteca trigona* must remain a mystery till they are encountered by some observer who can study the behavior of both ants and guests in an artificial nest. The powers of locomotion of the larvae must be nil or limited merely to slowly dragging themselves by means of their feeble mouth-hooks. Perhaps they are actually carried about the nest by the ants. That they may feed on ant larvae is suggested by the fact that the brood was much less abundant in the nest in which they occurred than in several uninfested nests of the same ant which I examined in the avocado orchard of Mr. John English at Frijoles."

Shortly after the appearance of Dr. Wheeler's paper Dr. Mario Bezzi suggested, in correspondence with Dr. J. M. Aldrich, the possibility of *Nothomicrodon aztecarum* Wheeler being the larva of a very

[1] Proc. Nat. Acad. Sci. **10**: 240. 1924.

unique South American dipteron, namely, *Masarygus planifrons* Brethes,[2] habitat, General Urquiza, Buenos Aires, Argentina, which has cleft antennae, or of one of its relatives. When Dr. Aldrich related this to the writer it recalled to his mind a Microdon-like syrphid in the undetermined material from Panama, collected by Mr. August Busck, which also had cleft antennae. It differs from the male of *Masarygus planifrons*, which has the third antennal joint divided into four branches, by having only two branches.

Brethes apparently was unaware of the relationship of his species to the Syrphidae, as he only compared it with the Syrphidae in the most casual way ("Solamente el abdomen es un poco hinchado en la hembra, mientras que el macho seria, bajo ese concepto, semejante a varios Syrphidae"). He compared the species with the Conopidae and the Oestridae, and on the basis of their differences erected the family Masarygidae: "De todo lo expuesto creo que la neuva familia Masarygidae debe colocarse entre los Conopidae y los Oestridae, pues con las demas familias la relacion es demasiado remota." His description and figures of *Masarygus planifrons* reveal such close similarity to the Microdontinae that it is necessary to include it in the *Microdon* group. Moreover, he related how he found his specimens on a wooden post, running in and out of the galleries of an ant, *Camponotus mus* Rog., which was inhabitating the post. All species of *Microdon*, as far as known, are myrmecophiles.

Dr. Bezzi in a subsequent letter to Dr. Aldrich states that *Masarygus* Brethes may be congeneric with *Ceratophya* Wiedemann, a genus established[3] just 100 years ago, and founded upon material collected in Brazil. Only female specimens were known to Wiedemann and they agree essentially with the female of *Masarygus planifrons* in which the antennae are normal. Unless the males of the species of *Ceratophya* have cleft antennae this genus must be considered as a synonym of *Microdon*, as now understood. Dr. Bezzi also gave the reference to his paper in which he states that *Masarygus* is probably synonymous with *Ceratophya*, essentially as outlined above.[4]

Whether *Masarygus* is generically distinct from *Microdon* on the basis of adult characters remains to be determined. The distinctive feature, i.e., the cleft antennae, as far as the evidence at present shows, is peculiar only to the male sex. Otherwise *Masarygus* is quite similar to a group of small, more or less yellowish, *Microdon* (*Ceratophya* ?)

[2] Mus. Nac. Buenos Aires 410. 1908.
[3] Wiedemann, *Analecta Entomologica* 14. 1824.
[4] Societas Entomologica **25**: 67. 1910.

occurring in the American tropics. The cleft antenna, without the arista, is unique in the Diptera. A number of species of Tachinidae have the third antennal joint cleft, but the arista is present. Certain Tabanidae (no arista occurs in this family) apparently have the cleft antennae, but this is owing to a projection from the upper basal corner of the third joint. A genus of Acaylpterae Diptera, *Cryptochaetum*, has no arista. The present species is tentatively placed in *Microdon* and for the present is designated by a distinctive specific name.

Family SYRPHIDAE

Masarygidae Brethes, Mus. Nac. Buenos Aires 410. 1908.

Genus **Microdon** Meigen, *sensu latus*.

Ceratophya Wiedemann, Analecta Entomologica 14. 1824.
Masarygus Brethes, Mus. Nac. Buenos Aires 410. 1908.
Nothomicrodon Wheeler, Proc. Nat. Acad. Sci. **10**: 240. 1924.

Microdon megacephalus, new species.

Male.—A small golden yellow species with dark mesonotal markings. Head very large, noticeably broader than high; eyes nearly twice as long as wide, very slightly approaching above; face very broad, widening upwards to near top of eyes; ocellar tubercle very prominent, ocelli closely grouped; the triangle broader than long; first antennal joint slender, about as long as distance between antennal base and eye margin; second joint very small; third joint nearly four times as long as first, very broad basally and sheet-like, with an incision extending nearly to its base, dividing it into two branches, each branch tapering to a point; front and face golden yellow, a blackish line extending across ocelli from eye to eye which is clothed with black, short, coarse pile; a similar dark line looped around antennal base; facial pile very sparse, golden; mouthparts somewhat reduced; thorax very small, much smaller in dorsal aspect than frontal aspect of head; with three broad blackish stripes; scutellum yellow; thoracic pile very sparse, coarse, reddish yellow; legs entirely yellow; fore and mid legs slender and with yellow pile; hind legs more or less swollen throughout; the tibia along the upper surface with densely matted, long black hairs; abdomen deep golden with sparse, coarse, golden pile; four-segmented, the fourth nearly as long as first three combined; hypopygium remarkably enlarged, globose, with coarse black hairs; wings hyaline; stigmatical crossvein present; spurious vein nearly obsolete; third vein simple; apical crossvein nearly straight, slightly directed basally, making apex of first posterior cell nearly quadrate. Length 7 mm., wing 5.5 mm., third antennal joint 2.75 mm., width of head 2.75 mm., width of thorax 2 mm.

Type locality.—Old Panama, Panama; January 31, 1911 (A. Busck).

Type.—Cat. no. 27824, U. S. N. M.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE PHILOSOPHICAL SOCIETY

911TH MEETING

The 911th meeting was held at the Cosmos Club, January 10, 1925, with President FLEMING in the chair and 52 persons present.

The address of the evening was given by the retiring president, D. L. HAZARD, on *Terrestrial magnetism in the Twentieth Century*. It has been published in full in this JOURNAL (**15**: 111–125. 1925).

912TH MEETING

The 912th meeting was held at the Cosmos Club, January 24, 1925, with President FLEMING in the chair and 50 persons present.

The program consisted of reports of the meeting of the International Geodetic and Geophysical Union held at Madrid in October, 1924. Professor H. F. REID presented the general report and also the report of the Section of Seismology. These were followed in turn by the report on the Section of Geodesy by WILLIAM BOWIE, the report on the Section of Meteorology by H. H. KIMBALL, and the report on the Section of Terrestrial Magnetism prepared by L. A. BAUER, read by W. J. PETERS in the author's absence.

H. D. HARRADON also contributed some interesting remarks on the Madrid meeting.

913TH MEETING

The 913th meeting was held at the Cosmos Club, February 7, 1925, with President FLEMING in the chair and 76 persons present.

Program: H. L. DRYDEN: *The Flettner rotor ship*. The paper was accompanied by practical demonstrations of the effects of air resistance and was discussed by Messrs. BREIT, HULBURT, and HEYL.—The Flettner rotor ship depends for its propulsion on the force exerted by the wind on a rotating cylinder. The force is similar in its nature to the force that lifts air-planes in that it is produced by an asymmetry in the object presented to the wind and in that the component of the force at right angles to the wind is many times larger than the component in the direction of the wind. Modern aerodynamical analysis relates this cross-wind component to the "circulation" of the fluid taken around the body. This modern point of view was set forth by the author in its relation to the simpler concept of momentum. Experiments were shown illustrating the existence of the large cross-wind component in the case of rotating cylinders.

The rotor ship was then described, together with the investigations leading to its construction. The advantages of the rotor ship over the usual type of sailing vessel are as follows: The crew required is very small. Less training is required to operate the rotor ship. The ship is more easily maneuverable than a sailing vessel, turning more quickly and without bringing the vessel to. Sail is automatically shortened in squalls. The vessel is more easily gotten under way. Very little attention is needed in varying winds. The disadvantages are as follows: The propulsive force is too small in light winds. There is some question as to safety in extremely high winds. The fact that the propulsive force is independent of wind speed above a certain speed may mean that full advantage can not be taken of strong winds. The

rotor ship makes a strong leeway in a following wind with cylinders turning or makes little headway if the cylinders are stopped.

The author called attention to the necessity of studies of cost of operation before a final comparison could be made, and expressed the opinion that for psychological reasons the invention would not generally be adopted. (*Author's abstract.*)

W. P. WHITE: *Some scientific aspects of the game of golf.*—Most games of skill are played with balls, and with a very great variety of balls and of bats or sticks for propelling them. The main principle of most of the active games, however, shows comparatively little variety. The object in the teamwork games is to keep control of the ball, passing it to your friends until it can be put across some sort of goal, while in games of the tennis family the object is to return the ball to your opponent and yet in such a way as to get the better of him. Another group of less active games starts the ball from rest: billiards, bowling, croquet, quoits, and golf are in this class. Here the interest that comes from activity and from outguessing your opponent are both wanting. Hence in these games other resources for variety are sought. In tenpin bowling, however, the thrill, the suspense, as the ball goes down the alley, and the feeling of power in propelling it and in seeing it hit, appear to be the only things which recommend the game. It is evident that these things are sufficient to redeem an extreme monotony. In billiards the use of more than one ball, with the necessary judging of various angles which this involves, calls for an intellectual exercise that adds to the interest. The element of variety from one day to another is absent from this game also, but appears in golf, owing to changes in the weather and in other conditions, and is particularly great when different courses are played on. There is also great variety in the kinds of strokes, some of which have to a superlative degree the elements of power and thrill, while others call for skill and control and adaptation to the terrain in different ways.

In hitting the ball into the air from the ground, a beveled or "lofted" club is essential and such a club always gives the ball an under or back-spin. This inevitable accompaniment is a great advantage, since it produces a lifting force which overcomes gravity for a while and so increases distance. The ball, hit with a back-spin, goes nearly horizontally for the first half of its flight, so that its path can be calculated by taking account only of the resistance of the air. Taking the law of air resistance, $\frac{dv}{dt} = -av^2$, which is a sufficient approximation for the present purpose, a couple of integrations gives $s = \frac{1}{a} \times \log_n \frac{v_2}{v_1}$ or the distance traversed while the ball is falling from one velocity to another is a function of the ratio of the two velocities and not of their absolute magnitude. Hence a livelier ball adds as many yards to a short driver as to a long driver, and is therefore more advantageous for the short driver. The ball of a powerful driver loses a third of its velocity and therefore nearly two-thirds of its energy in the first second after it is hit. The back-spin lift is proportional to the product of spin and speed. It mainly determines at what velocity the ball shall begin to fall. The weak hitter gets less spin from a given club. Hence his ball does not hold the air so well at the latter end of the drive. He can estimate this deficiency and get more spin by using a club with more bevel or loft. It is therefore important that weak drivers should have abundant loft on their driving clubs. (*Author's abstract.*)

Discussion. The paper was discussed by Messrs. L. J. BRIGGS, TUCKERMAN, HAZARD, C. A. BRIGGS, and CROOK.

914TH MEETING

The 914th meeting was held at the Cosmos Club, February 21, 1925, with President FLEMING in the chair and 30 persons present.

Program: O. S. ADAMS: *New world maps derived from elliptic functions.* (Illustrated).—In 1864 H. A. SCHWARZ of Halle gave a formula for the conformal representation of a circle in a regular polygon. In 1877 the first geographic map of this kind was constructed and published; in 1889 a second such map was derived in an entirely different manner. By a farther manipulation of the general expression of Schwarz seven new maps were computed and constructed, some for a hemisphere and others for the whole sphere. In addition to these, two other projections were shown, the second of which mapped the whole sphere in an ellipse with axes in the ratio of about two to one. Of these eleven projections which have been constructed for geographic purposes, no less than ten have been devised by members of the U. S. Coast and Geodetic Survey. A full discussion of the theory together with tables will soon appear as U. S. Coast and Geodetic Survey Special Publication No. 112. (*Author's abstract.*)

Discussion. The paper was discussed by Messrs. PAWLING, BREIT, HAWKSWORTH, MARMER, and TUCKERMAN.

H. W. FISK: *Magnetic secular change in Latin America* (Illustrated). The paper presented a review of the work done by the Department of Terrestrial Magnetism within the region under discussion, showing the positions on charts, and summarizing stations and repeat stations by means of tables.

It was pointed out that for each of the so-called magnetic elements, declination, inclination, and horizontal intensity, there exists in this area, a center, or focus of very rapid secular change. Charts were shown upon which were drawn the lines of equal annual change of each element for the year 1915, that being the mean year of the survey period. In the immediate vicinity of the centers, the lines of equal annual change formed closed curves, inclosing oval areas, while farther away the curvature of the lines was less regular.

While the chart was drawn for the epoch 1915, it was shown that the positions of these lines of equal annual change are continually shifting, as the rate of secular change varies from year to year and from place to place. Either there may be a motion of translation of the whole system of lines in any direction, or there may be a motion radially away from or toward the centers, which may move but little if at all. In the first case there will be accelerations of the secular rate of opposite sign on two sides of the center, depending on the direction of the translations; in the second case the accelerations will have the same sign on all sides of the center. The latter was found to be the case for all three elements. There was found to be a rapid increase of the annual rate up to the year 1914 or 1915 after which there was an even more rapid decrease at each of the centers, and this change at the centers was accompanied by changes of the same sign at stations in all accessible directions from these stations, which became less as the distance from the centers increased. From this it appears that the positions of the centers change slowly, if at all, but that the accelerations are due to alterations in the activity at the center.

These centers of greatest change were situated generally as follows: For declination near the mouth of the Amazon or in Guiana; for inclination, in western Colombia and Ecuador; for horizontal intensity, in the Bahamas or southern Florida. The radial movement of the lines of equal change in horizontal intensity was illustrated by a diagram showing the annual change for

each year from 1905 to 1923, as found from the annual means at the United States Coast Survey observatories. At Vieques and Cheltenham, east and north respectively from the center, the accelerations were very similar; at Tucson on the west but at a greater distance, the acclerations were of the same sign but smaller, while at Honolulu, the signs were the same but the magnitude was quite inconsiderable by comparison.

From the discussion of these centers for the period 1905–1923, it is concluded that the accelerations of changes of the secular rate were less near the lines of no change, than near centers of great change, and that a relatively small part of the acceleration is related to a change in position of those centers. (*Author's abstract.*)

Discussion. The paper was discussed by Messrs. PAWLING and BREIT.

G. BREIT: *The inductance and resistance of a coil encircling the Earth.* It has been suggested by Swann that one may be able to learn something about the electric and magnetic properties of the interior of the earth by studying the electromotive force induced in a loop of wire encircling the earth due to changes in a current maintained in another similar loop. In the present paper some calculations are made in order to investigate the possibilities of the idea. In view of the fact that it is easier to secure one loop than two, the electrical constants of a coil arranged equatorially around the earth are studied for the case of an alternating current passing through the coil. The coil is supposed to have the form of a single circular turn of wire. In view of the fact that the Heaviside layer appears to affect seriously the behavior of magnetic elements, an attempt was made to take it into account by introducing a conducting spherical shell into the problem, the shell being supposed to be concentric with the conducting core of the earth. The result of the calculation is too lengthy to be presented in this abstract. It may be stated, however, that in special cases definite, perceptible effects are to be expected and that by proper experimentation one may hope to learn something about the average properties of the earth to a depth of the order of 100 kilometers. The anticipated difficulties of the experiment lie mainly in the considerable length of time which is likely to be necessary in order to make the eddy currents penetrate through a sufficient thickness of the earth's crust. (*Author's abstract.*)

Discussion. The paper was discussed by Mr. WENNER.

915TH MEETING

The 915th meeting was held at the Cosmos Club on Saturday evening, March 7, 1925, with President FLEMING in the chair and 34 persons present.

Program: C. L. MITCHELL: *West Indian hurricanes, and other tropical revolving storms of the North Atlantic Ocean* (Illustrated).—A preliminary study of West Indian hurricanes in the Caribbean Sea during the period 1887–1923 confirmed the opinion of the writer that tropical cyclones do not originate over the eastern two-thirds, approximately, of the Caribbean Sea. This investigation proved so informative and interesting that the much more comprehensive work of plotting, from all available data, including original vessel reports, the tracks of all tropical cyclones of the North Atlantic Ocean, including the Caribbean Sea and the Gulf of Mexico, for the entire period for which daily weather charts of the North Atlantic Ocean are available, 1887 to 1923, inclusive, was begun.

The storms were classified according to their intensity, being divided into three groups, as follows:

1. Storms of known hurricane intensity.
2. Storms whose intensity was in doubt, because of an insufficient number of reports.
3. Storms not of hurricane intensity.

The total number of storms for the 37 year period was 239. Of these 122, or 51 per cent, were placed in group 1; 57, or 24 per cent, in group 2; and 60, or 25 per cent, in group 3.

The hurricane season in the region studied begins in June and ends in November. The tracks for each month were plotted separately, the number for each of the months being as follows: June, 16; July, 17; August, 39; September, 78; October, 71; and November, 15. In addition, one May and and two December storms were charted, but they did not reach hurricane intensity.

One of the principal results of the study was definite establishment of the fact that there are two well-defined areas where the majority of the tropical cyclones of the North Atlantic Ocean develop; one of these areas is the region a short distance south and southwest of the Cape Verde Islands where many cyclones develop during August and the first half of September, and the other is the western third, approximately, of the Carribbean Sea where the development of cyclones is most frequent at the beginning and again near the end of the hurricane season. It was found that cyclones do not develop over the North Atlantic within about 8 degrees of the equator, and that they develop farther north as a rule only when the belt of doldrums, or area of light variable winds between the northeast trades of the northern hemisphere and the southeast trades of the southern hemisphere, shifts far enough to permit deflective force of the earth's rotation to establish a circulation around a low pressure area.

Another important conclusion reached was that tropical cyclones of the North Atlantic Ocean seek to recurve to the north and northeast at the first favorable opportunity, irrespective of the longitude of the storm center, or the time of the year. The reason that so many cyclones move far to the westward before recurving is due to the semi-permanent area of high pressure that extends from the region of the Azores west-southwestward to the coast of the South Atlantic States of the United States, and effectively prevents the cyclones from moving northward, except in the infrequent instances when this area of high pressure breaks down. (*Author's abstract.*)

Discussion. The paper was discussed by Messrs. HEYL and PAWLING.

R. L. SANFORD: *The detection of flaws by magnetic analysis* (Illustrated).—The interpretation of the results of magnetic tests for the detection of flaws has been practically impossible due to the influence of internal stress on the magnetic properties. By making two or more tests at properly chosen values of magnetizing force, the disturbing effect of variations of internal stress can be eliminated. By the use of this method, the greatest obstacle in the way of satisfactory interpretation of results is overcome and it is possible in the light of the results here reported, that the method may be of practical value for the detection of flaws.

Discussion. The paper was discussed by Messrs. WHITE, HAWKESWORTH, TUCKERMAN, L. H. ADAMS, and SOSMAN.

916TH MEETING

The 916th meeting was a joint meeting with the scientific staff of the Bureau of Standards and was held at the Bureau of Standards on Wednesday, March 11, 1925.

The meeting was called to order by Dr. G. K. BURGESS, Director of the Bureau of Standards, at 3:30 p.m., with several hundred persons in attendance.

Professor P. DEBYE of Zurich addressed the meeting on *The Quantum Theory and its bearing on the classical laws of the Conservation of Energy and Momentum.*—When X-rays fall upon a single electron as in an ionized gas, two things occur: the electron is set in motion forward, and secondary X-rays are scattered in all directions, forward and backward, the intensity of the forward rays being the greater. This may be accounted for by supposing the quantum of energy incident upon the electron to be divided into a smaller quantum which is radiated as scattered X-rays, and energy of motion of the electron.

This explanation fails to account for the phenomena of interference. To include this we may suppose that the electron is radiating energy in all directions before being hit by the quantum, and that the condition afterward is the resultant of two conditions: the radiation and the secondary X-rays with motion of the electron. In this case we have to assume that the laws of the conservation of energy and of momentum do not hold instant by instant, but only are valid when averaged over a period of time. (*Abstract.*)

917TH MEETING

The 917th meeting was held at the Cosmos Club on Saturday evening, March 21, 1925, with President FLEMING in the chair and 25 persons present.

Program: H. A. MARMER: *Mean sea level* (Illustrated). For many geophysical purposes, some of the difficulties inherent in geodetic sea level may be overcome by defining geographic mean sea level at any point as the average level of the sea at that point or as the plane about which the tide oscillates. This makes the determination of mean sea level a problem in the field of tides, and from the results of tidal observations it is found that sea level varies from day to day, from month to month and from year to year.

The variation in sea level from day to day is conditioned by the weather, but that from month to month possesses a large element of periodicity, which is characteristic for a considerable area. From year to year the variation in sea level was found to be much the same over large areas. Notwithstanding occasional differences, it appears that if sea level in any one year is high or low at one point on the Atlantic coast of the United States, it is high or low all along the coast. And for the Pacific coast this was also found to be the case.

The fact that the variation in sea level is much the same over considerable areas makes it possible to determine mean sea level at any point with a considerable degree of precision even from short series of observations, if at some point not far distant a tidal station has been in operation for a number of years. (*Author's abstract.*)

The paper is to appear in full in the Annals of the Association of American Geographers.

Discussion. The paper was discussed by Messrs. SOSMAN, PAWLING, HUMPHREYS, LAMBERT, WRIGHT, HODGSON, and MOREY.

H. E. MERWIN and G. W. MOREY: *Optical effects of iron in certain glasses* (Illustrated). Ferric glasses with different amounts of iron were made by adding Fe_2O_3 to a glass containing 15 per cent Na_2O, 10 per cent CaO, and 75 per cent SiO_2. These were ground and oxidized at 600° in a current of oxygen, then heated at about 1000° to make them compact. In an 80

per cent PbO, $20SiO_2$ glass, 5 per cent Fe_2O_3 dissolved readily at about 800°. Ferrous glasses were prepared by heating to about 14000° in double graphite crucibles mixtures of ferrous oxalate and the lime-soda glass just mentioned. Timing to prevent formation of metallic iron, and also powdering and remelting to make homogeneous, were necessary.

The much greater effects of the ferric oxide on dispersion and refraction were shown by plotting optical measurements against compositions, as found by analysis.

Ferrous oxide is much the stronger coloring agent. It produces a greenish-blue color, and when ten per cent is present in the lime-soda glass, massed fragments 2 mm. in diameter appear black. Corresponding ferric glass is a slightly dull yellow. In the lead glass, five per cent Fe_2O_3 makes an apparently black glass which in 0.5 mm. thickness is deep orange-red. (*Authors' abstract.*)

Discussion. The paper was discussed by Messrs. SOSMAN and WRIGHT. Dr. W. J. HUMPHREYS gave an informal talk on *Tornadoes* which was discussed by Messrs. RUDE, PAWLING, WRIGHT, SOSMAN, LAMBERT, HECK, and TUCKERMAN.

H. A. MARMER, *Recording Secretary.*

BIOLOGICAL SOCIETY

673D MEETING

The 673d meeting of the Biological Society was held at the Cosmos Club January 17, 1925, with President ROHWER in the chair and 121 persons present. The President read a list of committees for 1925, as follows: *Committee on Communications:* W. R. MAXON, Chairman, H. C. OBERHOLSER, C. E. CHAMBLISS; *Committee on Publications:* C. W. RICHMOND, Chairman, J. H. RILEY, T. E. SNYDER, F. C. LINCOLN, G. S. MILLER, JR.; *Committee on Zoological Nomenclature:* G. S. MILLER, Jr., Chairman, P. BARTSCH, A. C. BAKER, E. A. CHAPIN, H. C. OBERHOLSER; *Trustees of Permanent Funds of Society:* T. S. PALMER (2 yrs.), H. C. OBERHOLSER (1 year), A. S. HITCHCOCK (3 years). The following members were elected: WILLIAM M. MANN (life member) and CARLTON P. ROBERTS.

T. S. PALMER described the feeding of quail in the District of Columbia by police using food supplied by the Audubon Society. Their reports, which covered only a few days and do not include the whole of the District, enumerated about 79 covies, amounting to some 918 birds. A similar census made about six years ago gave the number of birds as 1200, and one made two years later, 1400.

H. C. OBERHOLSER stated that a dead Baltimore oriole had been picked up in Anacostia about January 5. He also mentioned the increase in recent years of the canvasback duck.

F. C. LINCOLN reported the recovery in Newfoundland of a kittiwake banded in England. This is the first bird banded in Europe to be recovered in America north of Mexico. The man who collected the bird reported that it was good eating.

Program: A. B. HOWELL: *Mice that live in trees* (Illustrated).—The red tree mouse (*Phenacomys longicaudus*), with a discontinuous distribution throughout the humid coast forests of California and Oregon, is a member of a genus related to the common meadow mouse. It, however, is remarkable for the fact that it seems to be more truly arboreal than any other mammal of the United States save the flying squirrel. Its food consists of the

fleshy portion of the needles of the fir trees in which it lives. The midribs of these needles are not consumed, and these constitute the material with which the arboreal nests are constructed.

The comparatively large nests of the females are very much more numerous than the smaller ones of males, and this, coupled with the fact that all of the five specimens thus far secured upon the ground have been males, suggests the very unusual possibility that this sex spends a considerable portion of the time amid terrestrial surroundings while the females do not.

The young are remarkable for the slow rate of their development, the eyes not opening until the nineteenth day. The large, crested jays of the region have acquired the habit of tearing the nests to pieces in search of young mice. Data secured indicate that these mice, so specialized in habits, have few enemies with which to contend, and that their ecologic position is one in which they experience very little competition. (*Author's abstract.*)

R. F. GRIGGS: *Scientific results of the Katmai Expeditions* (Illustrated).—The speaker described the expeditions sent by the National Georgraphic Society between 1913 and 1919, in the course of which the "Valley of Ten Thousand Smokes" was discovered. The vegetation of the region was discussed with particular reference to its recovery after the volcanic eruption. The numerous colored slides shown, in connection with moving pictures taken in the Valley of Ten Thousand Smokes, gave a very clear idea of this remarkable region.

SPECIAL MEETING

A special meeting of the Biological Society was held in the National Museum January 24, 1925, with Vice-President OBERHOLSER in the chair and 85 persons present. The speaker of the evening was FRITS JOHANSEN, who described the natural history, geology, and geography of the region on the east shore of Hudson Bay as observed by himself on a trip made as far north as Richmond Gulf in 1920 under the auspices of the Department of Marine and Fisheries of Canada. The talk was illustrated by lantern slides, mainly from photographs taken by the speaker. The studies of this expedition showed that the Arctic marine fauna extends practically to the southern end of James Bay, in spite of the large amount of fresh water emptying into the Bay.

674TH MEETING

The 674th meeting was a joint meeting with the Audubon Society held in the National Museum January 31, 1925, with T. S. PALMER, President of the Audubon Society, in the chair. The program consisted of the regular annual meeting of the Audubon Society, and a paper by Dr. A. A. ALLEN, of Cornell University on *Our disappearing birds.*

675TH MEETING

The 675th meeting was held at the Cosmos Club, Feburary 14, 1925, with Vice President OBERHOLSER in the chair and 63 persons present. New member elected: Mrs. T. E. SNYDER.

VERNON BAILEY reported the observation of a duck hawk feeding on starlings on Pennsylvania Avenue.

A. WETMORE reported the first purple grackle seen at the Zoological Park on February 9. He also mentioned hearing a starling give the song of a meadowlark.

E. A. GOLDMAN reported the recent observation of a female Chinese pheas-

ant near the monastery at Brookland. A. WETMORE, discussing the local history of the Chinese pheasant, stated that several had been released in Maryland by E. LEE LECOMPTE, State Game Warden. Mr. ERNEST SMOOT several years ago turned out thirty-five birds in Klingle Valley.

S. F. BLAKE reported the observation of a bat flying about in Poli's Theater on February 10.

Program: EDGAR BROWN: *The longevity of buried seeds* (Illustrated).—Seeds of certain legumes (*Hovea linearis* and *Goodia latifolia*) collected in Australia by Robert Brown, and germinated after 105 years, furnish the longest authentic case of longevity of seeds. Prof. W. J. BEAL buried seeds in the earth 40 years ago, to be taken out at intervals and grown. At the end of this time, half of the species still germinated. DR. J. W. T. DUVEL formerly of the Seed Laboratory, buried seeds of 107 species of many different families in 1902. The seeds were buried at depths of 6 to 8 inches, 18 inches, and 3 feet. At the end of 20 years, 51 of the species germinated. In general, germination was better in the seeds buried at the greater depths. Of the total 107 species 36 failed to grow after 1 year.

ERNEST P. WALKER: *Commercial development of blue fox farming in Alaska* (Illustrated).—The blue fox, a color phase of the Arctic fox, is circumpolar in range in the wild state, and is slightly smaller than the red fox. It ranges nearly as far south on the Alaska coast as the Alaska Peninsula and occurs on the Priblof and other large islands of Behring Sea. In 1858 the Russians, who then had jurisdiction over Alaska, took steps to protect the blues on the Priblofs and reduce the whites. In 1885 the Semidi Propagating Company took blues from the Priblofs and stocked North Semidi Island off the Alaska Peninsula and from then till 1899 a number of islands were stocked as far east as Prince William Sound. About 1901 and for a few years following about ten islands were stocked in southeastern Alaska but only one continued in business. The entire industry declined until about 1916 and '17, when it began to revive.

At present practically all suitable islands along the Alaska coast are occupied for blue fox farming, and raising blue foxes in pens has been successfully undertaken. The animals on the islands are fed and cared for, but run at large. The young are born from late April to early June. Litters of as many as fifteen have been recorded but the more common ones run from five to nine.

Fish is the basis of the feed. It is fed fresh, dried, smoked and cooked, and mushes of cereals are often fed in conjunction with it. Losses from diseases and other causes have not been serious, and territorial legislation to check poaching has been enacted. Breeding stock has been selling for about $300 per pair. When the animals are killed for skins, they are taken in late November and December in small houses called trap-feed houses, in which the animals are ordinarily fed and where a number can be taken at once. With the development of successful penraising the industry can expand to a large area of the United States and Canada where the climate is suitable. (*Author's abstract.*)

H. L. SHANTZ: *Collecting experiences in East Africa* (Illustrated).—The speaker described his experiences in the "addo" bush in Cape Province, on the Kafue River in northern Rhodesia, in Urundi, on Lake Tanganyika, and in the waterhole country north and east of Mt. Kenya. The first camp was in a dense thorn thicket. In such places *Portulacaria afra* the "speckbroom" or "elephant-food," is one of the most important forage plants, eaten by wild elephants, domestic animals, and ostriches. On the Kafue in the open

forest and grassland were many wild fruit trees, among them *Garcinia livingstonei*, *Diopyros senegalensis*, *Ximenia americana*, and *Canthium lanciflorum*, and a fine display of terrestrial orchids of the genus *Lissochilus*. The larger game animals had deserted this region at the time of account of dry weather. *Brachylaena hutchinsii*, a composite, is one of the most important timber trees in British East Africa, and reaches a large size.

The distribution of game in Africa is very unequal. At times one may travel hundreds of miles without seeing any game animals; in other places hundreds of large game animals may be visible at one time.

676TH MEETING

The 676th meeting was held at the Cosmos Club February 28, 1925, with President ROHWER in the chair and 129 persons present. New members elected: CARL J. DREKE, A. BRUCE HORSFALL, MORRIS A. STEWART.

O. J. MURIE: *The white sheep of the Alaska Range* (Illustrated).—The white sheep, *Ovis dalli*, is found principally on the north slope of the Alaska Range. The south side is covered too deeply with snow for the sheep to find food in winter. On the north side the strong winds sweep the snow off exposed places and make the feed more accessible. The sheep range above timber, sometimes on gentle slopes, sometimes on rocky heights. They often flee for refuge into high rock masses, cliffs, and pinnacles. Among the companions of the sheep inhabiting the high country may be mentioned the caribou, grizzly, marmot, ground squirrel, and three species of ptarmigan. The vegetation is characterized by stunted forms of lowland plants. The sheep feed extensively on grass. Among other plants eaten may be mentioned *Dryas octopetala*. The sheep are found in greatest abundance in the Mt. McKinley region, where they are now protected. The paper was illustrated by lantern slides showing the sheep in their native haunts. (*Author's abstract.*)

HARRY V. HARLAN: *Plant exploration in Abyssinia* (Illustrated).—The northwest quarter of Abyssinia is a high plateau usually from 6,000 to 11,000 feet in elevation. It is populated by Amharas. On the east and south of this plateau there is a plain, usually about 5,000 feet high near the escarpment, and sloping gradually to the sea. The higher parts of this plain are occupied by Galla tribes.

The Gallas raise wheat, barley, sorghums, teff, flax, many varieties of peas and beans, and a number of garden vegetables. The Amharas grew small grains, barley, wheat, emmer, and teff. Broad beans and peas are produced in limited quantities. The cultivation of the highlands is most intense at the higher elevations. The percentage of tilled land and the density of population decreases with altitude. The highest ridges are given over to the cultivation of barley. Cultivation of wheat and emmer commences at slightly lower elevations. Teff is grown in the wheat belt and in the sorghum belt. Sorghums are cultivated at lower elevations than wheat. (*Author's abstract.*)

677TH MEETING

The 677th meeting was held at the Cosmos Club March 14, 1925, with President ROHWER in the chair and 75 persons present. New members elected: P. S. RIDSDALE, R. W. WESTWOOD.

C. W. STILES gave a report of his continued experiments on the polution of ground water. The chemical solution used has now been recovered at a distance of 414 feet from the well where introduced; the bacterial solution at 232 feet. As in the previous experiments, the bacteria remain at the top of the water level.

L. O. HOWARD referred to the newspaper reports of experiments made with mosquitoes in France. The report states that *Culex* mosquitos, transferred from a place where they bit only birds to Paris, interbred there with the man-biting race, and the offspring lost the power of biting. It is questionable whether this will be true of subsequent generations.

Program: R. C. SHANNON: *Parasitic flies in man and animals* (Illustrated).—A certain group of Muscoid flies, the Oestridae or bot flies, are obligate parasites in mammals. However, many of the species of Muscoid flies which do not belong to the oestridae have similar habits and these serve to show the transition from forms which are usually saprophytic but may occasionally be myiasidic in habit to those forms which are true myiasids or bot flies and have specific vertebrate hosts. The Muscoid group, which is a very large one, is divisible into two subgroups, one of which lacks hypopleural bristles and tends to be vegetarian in diet, while the other group, which possesses hypopleural bristles, tends to feed on flesh. The more highly specialized of these are the bot flies and parasites of other insects. Specimens of many of the species mentioned were placed on exhibition. (*Author's abstract.*)

JAMES SILVER: *The European hare in North America: is it a menace?* (Illustrated).—The European hare, *Lepus europaeus*, is now firmly established in North America. It was introduced as a game animal for use in coursing. There have been five or more introductions originating from Hungary, Germany, and England. The first introduction was in 1888, the hares being liberated at Jobstown, N. J. Others were at Millbrook, N. Y., from 1893 to 1911 and at Brantford, Ont., in 1913. These three have proved most successful from the standpoint of subsequent abundance and spread.

The hares have attained a maximum abundance in Dutchess and adjoining counties, New York. In Dutchess County a recorded drain of over 3,000 hares per year for six years failed to appreciably reduce their numbers. In New Jersey the increase has been very slow except in a few favorable localities, while in Ontario the animals widened their range to some 4,500 square miles in ten years.

The injury chargeable to these hares is confined largely to young fruit and shade trees, ornamental shrubs and small fruits and then only during periods of heavy and persistent snow fall. Very severe injury in the past has been due to a lack of information as to how to protect the trees from possible depredations. This is being corrected by the local orchardists with the assistance of economic mammalogists so that the menace of the hare is being greatly lessened without reducing the numbers of this otherwise valuable game animal. (*Author's abstract.*)

W. M. MANN: *A collecting trip in Sinai and Palestine* (Illustrated).—The speaker gave an account of a trip made in 1914, in company with Dr. JOHN C. PHILLIPS, along the Mosaic trail from Egypt to Jerusalem. Collections were made en route at stops at the Wady Feran, Akaba, Petra, and the Dead Sea.

From Egypt to Akaba the journey was made by camel caravan, afterwards by mule train. A number of new species were collected, and large collections made of others, including the Syrian ibex, Butler's owl, a new subspecies of rosy finch, the Moabitic sparrow, and a number of ants. (*Author's abstract.*)

S. F. BLAKE, *Recording Secretary.*

THE ANTHROPOLOGICAL SOCIETY

585TH MEETING

The 585th meeting was held November 18, 1924, in the National Museum. *Program:* Dr. ROBERT S. WOODWORTH, chairman of the Division of Anthropology and Psychology of the National Research Council: *The relations of Psychology and Anthropology.*

Dr. Woodworth stated that though anthropology is closely affiliated with geology, anatomy, history, and sociology, and though psychology is closely affiliated with sociology, physiology, and the science of education, it is noteworthy that when an academy or similar general scientific body organizes itself into divisions, anthropology and psychology are usually brought together into a single division. The two sciences seem to gravitate together at the border of the natural science field closest to the contiguous territory of the social sciences.

There is little duplication of effort between anthropology and psychology, though they lie so close to one another. Anthropology is distinctly a study of the human species, whereas psychology is rather a study of certain processes basically common to man and animals, and often best studied in animals.

Psychology, though undoubtedly interested in problems of race and culture, does not itself investigate these questions. When the psychologist speaks of *race* he is apt to be uncritical, meaning nothing more than a group of common parentage. Psychologists of late have been interested in attempting to measure the intelligence of different groups, but they have not thought of intelligence as a race characteristic in the anthropological sense. From their angle, for example, there is no *a priori* reason to expect nationalities within a single great race to be more alike in intelligence than nationalities selected from different races.

The relation between the two sciences is peculiar in this respect—that each is a basal science for the other. Thus the anthropometric and statistical technique of anthropology is essential in the psychological work of testing, while on the other hand, the psychological technique of testing is a desideratum of the anthropologist in his study of races. Or again, psychology is basal to anthropology in the interpretation of many cultural phenomena, while on the other hand the scientific knowledge of the cultural background is necessary for the psychologist in tracing the mental development of the individual.

589TH MEETING

The 589th meeting was held March 17, 1925, at the National Museum. *Program:* DR. M. J. HERSKOVITZ, of Howard University: *Some aspects of of the anthropology of the American negro.* Up to the present, the study of racial crossing has yielded few results, due largely to the difficulty of obtaining authentic material. The present study concerns itself with negro-white crossing, data on which have been gathered by the speaker during the past two years. These consist mainly in a large series of measurements of negro children at Public School 89 and at the Colored Orphanage, both of New York City, and of male students at Howard University.

The chief problem in the study of mixed groups is not the determination of the "racial" qualities which they may have, but rather the extent to which such groups are homogeneous or heterogeneous; if homogeneous, how may the group be described; if heterogeneous, what are the forces which are keeping the group so, and, how may it be described? Certain results of the

data gathered on these American negroes force one to the hypothesis that the American negro is establishing a rather distinct type, which is relatively homogeneous when compared with the general population. This may be investigated in certain ways; thus, a study of the growth-curve of the negro boys in New York City showed that there was a distinct curve for the negro population,[1] when compared with the curve for the general white population. Even though living on the poverty line, the colored boys showed an acceleration of some five pounds in weight and four to six centimeters in height, age for age, when compared with the curve for the general white population. When the curve is compared with that for the children in the Orphanage, it is found that the effect of environment is such that the Orphanage children, though living in much better surroundings, are retarded when compared with the public school children; and yet the stock is essentially the same for the two series. This follows Boas' findings[2] so closely that it implies a "racial" growth curve.

The study of heterogeneity or homogeneity, however, is best approached through the computation of the variability of the averages of the children in families in a given population, the assumption being that in an inbred population, since any single family would represent the entire population, such variability would be relatively low, while in a mixed one, no one family would be representative. There can be computed both the variability between family lines, and within them, and we find, when we take fraternities of the New York negro population, which are probably a good sample of the country's population as a whole, that the variability of the family lines is relatively low, while that within the families is relatively high.[3] This leads to the assumption that there has been a large amount of crossing by this population, but that this has decreased largely in amount, and that for the past few generations there has been consolidation of type through breeding within the group.

This hypothesis is so different from that which is generally held to be the case that the element of social selection, which makes it possible, must be sought. It has been asserted that the element of color among the negroes is an important social selective medium.[4] Lightness is at a premium, and therefore the dark man seeks a lighter-colored wife, while the light-colored woman prefers the darker man. The very light men and the very dark women are thus sloughed off from the group, resulting in a concentration somewhere within the extremes. To test this at Howard, I questioned the men whom I measured concerning the relative color of their parents. The replies showed that in over 60 per cent of the total number of cases (or in 75 per cent of the number giving their parents as "about the same color" be disregarded) the mothers were lighter than the fathers. Thus we have here the social selective element necessary to account for our findings. (*Author's abstract.*)

JOHN M. COOPER, *Secretary.*

[1] M. J. HERSKOVITS, *Some observations on the growth of colored boys.* Amer. Journ. Phys. Anthro. 7: 439–446.

[2] FRANZ BOAS, *The growth of children as influenced by environmental and hereditary conditions, School and Society,* pp. 305–308.

[3] M. J. HERSKOVITS, *On the Negro-White population of New York City; the use of the variability of family strains as an index of heterogeneity or homogeneity.* (To be published in the Proceedings of the 21st Congress of Americanists, part 1, The Hague, August, 1924.)

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